

# Happy Cow or Thinking Pig? WUR Wolf – Facial Coding Platform for Measuring Emotions in Farm Animals

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**Table S1.** The confusion matrix of DarkNet-53 trained and tested on the farm animals' images and videos dataset using YoloV3

	Cow Excited Cow Frustrated Cow Relaxed Aversion Negative Negative Emotions Neutral State Aggression Alert Neutral Positive Emotions								
Cow Excited	103	2	5	0	3	0	1	5	0
Cow Frustrated	4	94	3	12	2	8	0	0	1
Cow Relaxed	10	0	75	2	1	0	0	4	0
Aversion Negative	8	0	1	101	1	2	0	4	0
Negative Emotions	0	1	1	4	114	2	0	1	0
Neutral State	1	1	0	1	4	85	2	1	0
Aggression	3	0	0	1	1	1	120	0	1
Alert Neutral	0	0	2	0	3	0	4	96	6
Positive Emotions	0	1	2	4	6	1	0	2	110

**Table S2.** The confusion matrix of CSPDarkNet-53 trained and tested on the farm animals' images and videos dataset using YoloV4

	Cow Excited Cow Frustrated Cow Relaxed Aversion Negative Negative Emotions Neutral State Aggression Alert Neutral Positive Emotions								
Cow Excited	100	1	0	0	4	3	0	0	0
Cow Frustrated	1	99	0	2	5	4	3	4	1
Cow Relaxed	2	1	83	0	1	0	0	1	1
Aversion Negative	2	0	1	108	1	2	5	2	3
Negative Emotions	0	0	0	1	131	2	0	0	0
Neutral State	2	0	1	1	8	105	0	1	3
Aggression	4	1	1	2	1	0	92	2	0
Alert Neutral	2	0	0	1	2	0	1	97	12
Positive Emotions	5	4	0	1	0	0	0	2	106

**Table S3.** The confusion matrix of VGG-16 trained and tested on the farm animals' images and videos dataset using Faster RCNN

	Cow Excited Cow Frustrated Cow Relaxed Aversion Negative Negative Emotions Neutral State Aggression Alert Neutral Positive Emotions								
Cow Excited	114	1	6	0	14	0	0	3	1
Cow Frustrated	0	86	3	14	0	4	1	0	0
Cow Relaxed	1	0	96	2	3	0	4	1	0
Aversion Negative	8	0	1	101	0	0	0	2	1
Negative Emotions	0	1	1	4	112	2	0	1	0
Neutral State	0	0	1	1	8	99	2	1	4
Aggression	7	0	0	3	2	1	110	1	1
Alert Neutral	2	1	0	0	1	0	1	66	1
Positive Emotions	4	1	1	0	3	1	0	2	108

**Table S4.** F1-Scores for emotion detection and recognition by Yolov3 from facial features of cows and pigs' images and videos data set

Classes	Precision	Recall	F1-Score
Cow Excited	0.79	0.86	82%
Cow Frustrated	0.94	0.75	83%
Cow Relaxed	0.84	0.815	82%
Aversion Negative	0.808	0.86	83%
Negative Emotions	0.84	0.92	87%
Neutral State	0.85	0.89	86%
Aggression	0.94	0.94	94%
Alert Neutral	0.84	0.86	84%
Positive Emotions	0.92	0.85	88%

**Table S5.** F1-Scores for emotion detection and recognition by Yolov4 from facial features of cows and pigs' images and videos data set

Classes	Precision	Recall	F1-Score
Cow Excited	0.84	0.92	87%
Cow Frustrated	0.93	0.83	87%
Cow Relaxed	0.96	0.93	94%
Aversion Negative	0.93	0.87	89%
Negative Emotions	0.85	0.97	90%
Neutral State	0.91	0.86	88%
Aggression	0.91	0.89	89%
Alert Neutral	0.88	0.84	85%
Positive Emotions	0.9	0.84	86%

**Table S6.** F1-Scores for emotion detection and recognition by Faster RCNN from facial features of cows and pigs' images and videos data set

Classes	Precision	Recall	F1-Score
Cow Excited	0.83	0.82	82%
Cow Frustrated	0.96	0.79	86%
Cow Relaxed	0.88	0.89	88%
Aversion Negative	0.80	0.89	84%
Negative Emotions	0.92	0.92	84%
Neutral State	0.85	0.78	88%
Aggression	0.88	0.93	90%
Alert Neutral	0.91	0.85	87%
Positive Emotions	0.90	0.93	91%